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Specification

Methods for Controlling Both a First Roll, Which Takes Up a Damping Agent from a Damping Agent Source, as well as a Second Roll, and Damping System

The invention relates to methods for controlling a first roller, which takes up a dampening agent from a dampening agent source, and a second roller, in accordance with the preambles of claims 1, 2, 4, 6 or 8, and to dampening units in accordance with the preambles of claims 24, 26, 29, 31 or 87.

A dampening unit is known from USP 3,168,037, wherein either a fountain roller, which takes up the dampening agent from a dampening agent reservoir, or a transfer roller rolling off on the fountain roller, are driven by means of a controllable drive mechanism in such a way that a rotating speed of these two rollers can be changed, but that the amount of the rotating speed of these two rollers is always identical.

A dampening unit is known from USP 3,986,452, wherein a fountain roller taking up a dampening agent from a dampening agent reservoir and at least one further roller, which is in roller-to-roller contact with the fountain roller, have controllable drive mechanisms, each of which is independent of the other, wherein this further roller is in a roller-to-roller contact with a dampening agent application roller placed against a forme cylinder, wherein a traversing bridge roller is placed against the dampening agent application roller.

A dampening unit with a fountain roller taking up a dampening agent from a dampening agent reservoir and with a slip roller rolling off on the fountain roller is known from EP 0 893 251 A2, wherein both rollers can be driven by separate drive mechanisms, if required, but wherein both rollers always have the same surface speed.

A film-type dampening unit for rotary printing presses is known from EP 0 462 490 A1, wherein, in a roller train extending from a dampening agent tank as far as the forme cylinder and consisting of three or four rollers, a fountain roller and a metering roller are driven together by a first electric motor, wherein a dampening agent distribution roller following the metering roller in the roller train is additionally moved axially back and forth by a mechanism, and wherein a bridge roller is placed against a dampening agent application roller placed against the dampening agent distribution roller and the forme cylinder.

A dampening unit of an offset rotary printing press is known from DE 29 32 105 C2, wherein the dampening unit has a roller train consisting of three rollers extending from the dampening agent pick-up up to the forme cylinder, and each one of the three rollers is driven independently of each other by a controllable electric motor, which preferably can be set in an infinitely variable manner.

A drive mechanism for the dampening unit of an offset printing press is known from DE 38 32 527 C2, wherein a traversing bridge roller is provided, which is simultaneously placed against a dampening agent application roller and an ink application roller, wherein the bridge roller is

pneumatically driven, wherein its number of revolutions is controlled by changing the pneumatic pressure.

A dampening unit for a printing press is known from DE 299 00 216 U1, wherein a first roller, which takes up a dampening agent, and a second roller, which is connected with the first roller for transferring dampening agent, are provided, wherein both rollers are rotatingly driven and wherein a slippage between the two rollers exists, which can be set by a control means when the dampening unit is operated.

Drive mechanisms for a printing group are known from WO 03/039873 A1, wherein the rotatory driving and the traversing driving devices of a roller are arranged on its opposite ends.

A dampening unit of an offset rotary printing press is known from JP-A-01 232 045, wherein the dampening unit has a roller train consisting of three rollers extending from the dampening agent pick-up up to the forme cylinder, and wherein the fountain roller (1st roller), as well as the transfer roller (2nd roller) are driven independently of each other by a controllable motor.

The object of the invention is based on creating a method for controlling a first roller, which takes up a dampening agent from a dampening agent source, and a second roller.

In accordance with the invention, the object is attained by means of the characteristics of claims 1, 2, 4, 6 8, 24, 26, 29, 31 or 87.

The advantages to be gained by means of the invention lie in particular in that the fountain roller and an adjacent

dampening agent transfer roller can be controlled completely independently of each other. The slippage being formed between them because of an intentional difference in their surface speeds is adjusted as needed for a correct metering of a dampening agent to be applied to the rollers. The adjustment of the slippage takes place in particular as a function of a change of the surface speed of the forme cylinder.

Exemplary embodiments of the inventions are represented in the drawings and will be described in greater detail in what follows.

Shown are in:

Fig. 1, a dampening unit with four rollers in a roller train to the forme cylinder,

Fig. 2, a dampening unit with three rollers in a roller train to the forme cylinder.

In respective schematic representations, Figs. 1 and 2 show a dampening unit 01, preferably a film-type dampening unit 01, with a first roller 04 and a second roller 06, wherein the first roller 04 takes up a dampening agent 02, for example water 02 or an alcohol-water mixture 02 from a dampening agent source 03, for example a dampening agent reservoir 03, in particular a dampening agent tank 03, or from a dampening agent trough 03, wherein the first roller 04 transfers at least a portion of the dampening agent 02 directly to the second roller 06, which is arranged adjacent to the first roller 04. Therefore the first roller 04 is preferably embodied as a fountain roller 04 or a duct roller 04. Alternatively, the dampening agent source 03 can be embodied, for example, as a spray crosspiece 03 with a least

one spray nozzle 03, which sprays the dampening agent 02 onto the first roller 04, wherein the dampening agent 02 is applied to the first roller 04 in the form of finely distributed droplets. Further designs provide for embodying the dampening unit 01 as a brush dampening unit or a centrifugal dampening unit, with which the dampening agent 02 is also applied to the first roller 04 in a contactless manner. The second roller 06 can be a metering roller 06, a dampening agent transfer roller 06 or a distribution roller 06, each one preferably with a chrome-plated or ceramic-coated surface. The first roller 04 is the first of several rollers in a roller train, over which the dampening agent 02 is conveyed from the dampening agent reservoir 03 to the forme cylinder 09 of a printing press operated by the offset printing process, to which the dampening unit 01 has been assigned. The ones in Figs. 1 and 2 differ in particular in the number of rollers arranged in the roller train.

The printing press is designed, for example, as a jobbing printing press, for example. Its printing group has at least one forme cylinder 09 and one transfer cylinder (not represented), wherein these two cylinders roll off on each other. A jobbing printing press, preferably a jobbing printing press operating by the offset printing method, is understood to be a printing press with a forme cylinder 09, wherein only a single printing forme is arranged on its forme cylinder 09 in the axial direction of the latter, wherein the printing forme preferably has several print image locations in a direction extending axially in respect to the forme cylinder 09, wherein the print image locations are not in a predetermined format, i.e. can have any arbitrary width

within defined limits, in particular in a direction extending axially in respect to the forme cylinder 09.

For a good printing result, dampening units 01 using a dampening agent 02 to which, for example for reducing environmental stress or the reduction of its cost, preferably no alcohol at all, or at least only very little alcohol is added, in particular isopropyl alcohol (IPA) of clearly less than 5% of the volume of all the matter added to the dampening agent 02 as a whole, require a very precise setting of the amounts of dampening agent 02, which is matched to the respective production speed and is to be conveyed to the forme cylinder 09 during the production of the printing press, i.e. while it is printing. To make matters worse, it is required to realize an increasingly higher production speed of the printing presses. Today's printing presses easily attain a production speed of their printing group cylinders of 70,000 to 80,000 revolutions per hour. If the diameters of the transfer cylinders and forme cylinders 09 which are in operative contact with each other are identical, the production speed of the printing press corresponds to the surface speed v09 of the forme cylinder 09. The dampening unit 01 with the characteristics being described in what follows assures the transport of a sufficient amount of dampening agent 02, which can be exactly metered, even at such high production speeds.

Furthermore, the amount of the dampening agent 02 required at the forme cylinder 09 for good printing results is a function of the emulsification properties of the ink used and of the amount of ink required for producing the printed product. The ink and the dampening agent 02 form a

mixture wherein, depending on the condition of the ink, a volumetric portion of the amount of the dampening agent 02 which can be varied within defined limits can be mixed together with the ink. The ink switched back into the dampening unit 01 can absorb the dampening agent 02 in amounts between 15% and 25%, for example. The amounts increase with an increase in the surface speed v09 of the forme cylinder 09. However, a threshold value is set for the amount of dampening agent 02 emulsified by the ink because, for example, the ink imprinted on a material to be imprinted, for example a paper web, must dependably dry in the course of the passage of the material to be imprinted through a drying unit, for example a headset dryer, arranged downstream of the printing group. Because of the desired high production speed of 12 m/s or more, the retention time of the material to be imprinted in the drying unit is very short.

The more colored print image locations a printed product has, the more ink is needed at the forme cylinder 09. Accordingly, for setting a required balance between ink and dampening agent 02 it is also necessary in such a case to make available a greater amount of dampening agent 02 at the forme cylinder 09 if a more color-intensive printed product is created by means of the printing press. Therefore, for a satisfactory printing result, the dampening unit 01 with the characteristics described in what follows matches the amount of dampening agent 02 made available at the forme cylinder 09 also as a function of the condition of the ink and the amounts required for the printed product to be created.

In order to make possible an adaptation of the requirements of amounts of dampening agent 02 made available

at the forme cylinder 09 as a function of the production speed of the printing press and the balance between ink and dampening agent 02 to be set, the first roller 04 and the second roller 06 have separate drive mechanisms 07, 08, i.e. those which can be controlled independently of each other. Drive mechanisms 07, 08 for the first roller 04 and the second roller 06, which can be controlled independently of each other, have the advantage that a surface speed v04 of the first roller 04 generated by the drive mechanism 07, and a surface speed v06 of the second roller 06 generated by the drive mechanism 08, do not rigidly follow a parameter affecting the amount of dampening agent 02, wherein instead, for matching of the amounts of dampening agent 02 to be conveyed, the ratio of the surface speeds v04, v06 in respect to each other can also be variably set according to the requirements, by which the metering of the dampening agent 02 to be conveyed by the dampening unit 01 is considerably affected. As a function of the actually existing printing process, for the same value of the surface speed v09 of the forme cylinder 09 different settings of the surface speed v04 of the first roller 04 and of the surface speed v06 of the second roller can result, as well as regarding their ratio in respect to each other.

As a rule, the surface speed v04 of the first roller 04 generated by the drive mechanism 07, and the surface speed v06 of the second roller 06 generated by the drive mechanism 08 are different from each other. Preferably the surface speed v04 of the first roller 04 is less than the surface speed v06 of the second roller 06. The surface speeds v04, v06 can be set independently of each other and variably. In

a preferred embodiment, the surface speed v06 of the second roller 06 lies for example between twice to four-and-a half times, in particular three times, that of the surface speed v04 of the first roller 04. The size of the surface speed v04 of the first roller 04 is limited by the requirement that the first roller 04 must dependably pick up the dampening agent 02 out of the dampening agent reservoir 03 on its surface. Experience has shown that, starting at a surface speed v04 of the first roller 04 of more than 2 m/s, the dependable pickup of dampening agent 02 is no longer assured, since in that case considerable amounts of the dampening agent 02 are flung off the surface of the first roller 04. Therefore the surface speed v04 of the first roller 04 is preferably set to lower values than its upper limit speed, for example to a value of at most 1.5 m/s. In contrast to this, the surface speed v09 of the forme cylinder 09 lies at 12 m/s to 15 m/s, for example.

If the surface speed v06 of the second roller 06 is greater than the surface speed v04 of the first roller 04, which as a rule is the case, a slippage exists between the first and the second roller 04, 06, because the surface speed v04 of the first roller 04 lags behind the surface speed v06 of the second roller 06. This slippage, formed by the ratio of the two surface speeds v04, v06 of the two rollers 04, 06, can be variably set by means of the drive mechanisms 07, 08 of the first roller 04 and the second roller 06, which are independent of each other.

The amount of dampening agent 02 to be conveyed by the roller train of the dampening unit 01 must be adjusted as a function of a change of the surface speed v09 of the forme

cylinder 09 driven by a further drive mechanism 18, for example when increasing the surface speed v09 of the forme cylinder 09, for example from a set-up speed of the printing press to its production speed. For example, the set-up speed of the printing press lies between 1.7 m/s and 3.4 m/s, preferably between 2 m/s and 2.6 m/s, and therefore amounts to between 11% and at most 25% of the production speed of the printing press, or the surface speed v09 of the forme cylinder 09. Thus, for reaching the production speed, the surface speed v09 of the forme cylinder 09 is increased between four times to nine times, starting from the set-up speed. A rapidly reacting dampening system unit 01, which can be matched to the requirements of the dampening agent 02 to be conveyed, is therefore required for such a large increase in speed. In the same way the conveyed amount of dampening agent 02 must be respectively adjusted during start-up of the printing press from its stopped state, or when the production speed is reduced. Moreover, as mentioned, the actual requirement for dampening agent 02 is a function of the amount of ink needed for the production of the printed product. In many cases of application, in particular in connection with printing presses with a large increase in speed, a sufficient reaction to this matching requirement is not always possible with a rigid coupling, for example a gear coupling between the first roller 04 and the second roller 06.

For providing the required matching, the number of revolutions of the drive mechanisms 07, 08 of the rollers 04, 06 of the dampening unit 01 is controllable, preferably infinitely variably controllable, in particular

electronically controllable. Control can be performed remotely, for example from a control console assigned to the printing press. The drive mechanisms 07, 08 for the first roller 04 and the second roller 06 are preferably embodied as electric motors 07, 08, for example as a.c. or d.c. motors 07, 08, or as frequency-controlled multiphase a.c. motors 07, 08. The drive mechanism 18 of the forme cylinder 09 can also be embodied as an electric motor 18, for example as an a.c. or d.c. motor 18 or a frequency-controlled multiphase a.c. motor 18 and, the same as the drive mechanisms 07, 08 of the rollers 04, 06 of the dampening unit 01, can also be controllable. The drive mechanism 18 of the forme cylinder 09 is independent of the drive mechanisms 07, 08 of the rollers 04, 06 of the dampening unit 01 in particular, i.e. in particular there is no positive connection between the drive mechanisms 07, 08 of the rollers 04, 06 and the drive mechanism 18 of the forme cylinder 09. It is not required that the drive mechanism 18 of the forme cylinder 09 exclusively only drives the forme cylinder 09, but the drive mechanism 18 transfers the torque it has generated at least to the forme cylinder 09, but possibly also to the transfer cylinder (not represented), which works together with the forme cylinder 09.

If required, the control device of the drive mechanisms 07, 08, 18 can be expanded into a regulating device by adding a positive feedback device picking up an actual value, and an evaluation device for evaluating a feed-back signal, wherein preferably the actual value of a number of revolutions of the rollers 04, 06 or of the forme cylinder 09 is detected, for example, by means of a sensor providing an electrical output

signal. The control or regulation of the drive mechanisms 07, 08 is preferably performed with the aid of a computing unit (not represented), which for example predetermines a corridor for advantageous setting values.

The first roller 04 and the second roller 06 of the dampening unit 01 constitute the first rollers in the roller train conveying the dampening agent 02 to the forme cylinder 09, wherein the surface speed v04 of the first roller 04 and the surface speed v06 of the second roller 06 can be set independently of each other and without a rigid dependence on the surface speed v09 of the forme cylinder 09. As a rule, the surface speed v04 of the first roller 04 or the surface speed v06 of the second roller 06 are less than the surface speed v09 of the forme cylinder 09.

In a first operating state of the dampening unit 01 it is possible to provide that the surface speed v09 of the forme cylinder 09 and the surface speed v06 of the second roller 06 are at a first ratio in respect to each other, while in a second operating state of the dampening unit 01 the surface speeds v09, v06 are at a second ratio in respect to each other. The surface speed v09 of the forme cylinder 09 can have the same value during both operating states of the dampening unit 01, or can assume values which differ from each other.

The roller train to the forme cylinder 09 can be expanded by a third roller 11, or also by a fourth roller 13, wherein the third roller 11 is placed downstream of the second roller 06 and the fourth roller 13 downstream of the third roller 11. The third roller 11 is coupled, for example by means of a set of gears 12, for example a gear wheel drive

12 or a belt drive 12, with the second roller 06. Alternatively, driving of the third roller 11 takes place by means of friction, for example at the second roller 06, or by friction with the forme cylinder 09. The surface speed of the rollers provided in the roller train to the forme cylinder 09 has been respectively set in such a way that there is slippage between the second roller 06 and the third roller 11, or between the third roller 11 and the fourth roller 13. The slippage between the first roller 04 and the second roller 06 can be, for example, 1:3, wherein the first roller 04 rotates slower than the second roller 06. The slippage between the second roller 06 and the third roller 11 can be selected to be considerably greater, wherein the third roller 11 rotates very much faster than the second roller 06.

For an improved distribution of the dampening agent 02 of the surfaces of the rollers 06, 11, 13 arranged in the roller train, and for preventing patterning, at least one of these rollers 06, 11, 13 which follow the first roller 04 in the roller train can be embodied to perform traversing movements. It is advantageous to decouple the traversing drive mechanism 19 provided for this from the rotatory drive mechanisms 07, 08 of the rollers 06, 11, 13 and to design it to be controllable independently of the latter. The frequency of the traversing movement in particular can be freely selected. The length of the traversing movement is for example ± 8 mm. However, it is also possible to provide a variably adjustable length of the traversing movement, for example between 0 mm and 16 mm. The traversing drive mechanism 19 is embodied, for example, as an electrical motor 19, for example a linear motor 19. The roller 11, 13

transferring the dampening agent 02 to the forme cylinder 09 is in particular driven by means of friction by the forme cylinder 09.

An inking unit 16 with at least one ink application roller 17, which can be placed against the forme cylinder 09, is assigned to the forme cylinder 09, wherein the inking unit 16 inks a printing forme (not represented) mounted on the surface of the forme cylinder 09 by means of the ink application roller 17. The roller 06, 11, 13 primarily applying the dampening agent 02 to the forme cylinder 09, i.e. depending on the embodiment of the roller train the second roller 06, the third roller 11 or the fourth roller 13, can then advantageously be placed simultaneously against the forme cylinder 09 and the ink application roller 17, or against an ink distribution roller of the inking unit 16 working together with the forme cylinder 09. The placement of the roller 06, 11, 13, which applies the dampening agent 02 to the forme cylinder 09, against the ink application roller 17 can therefore occur directly or indirectly, for example via a bridge roller 14 embodied as an ink distribution roller 14. In connection with a dampening unit 01 with four rollers 04, 06, 11, 13 in the roller train in particular it is possible to provide a further second bridge roller 23 (represented in dashed lines in Fig. 2) placed upstream of the first bridge roller 14, wherein the upstream located bridge roller 23 is arranged between the first bridge roller 14 and the third roller 11, i.e. the roller 11 which, in the roller train, is arranged upstream of the fourth roller 13 which applies the dampening agent 02 to the forme cylinder 09. Preferably the first bridge roller 14 is seated

in a frame (not represented), and is movable by at least one actuating means, for example a remote-controlled working cylinder, in particular a pneumatic cylinder (not represented) in such a way that it can selectively assume, for example controlled from a control console, one of the four operating positions described in what follows. In one operating position it is placed against the ink application roller 17 and not against the roller 06, 11, 13 applying the dampening agent 02 to the forme cylinder 09. In another operating position, the bridge roller 14 is placed against the roller 06, 11, 13 applying the dampening agent 02 to the forme cylinder 09 and not against the ink application roller 17. In a further operating position, the bridge roller 14 is placed simultaneously against the roller 06, 11, 13 applying the dampening agent 02 to the forme cylinder 09 and against the ink application roller 17, which is its normal operating position, wherein the bridge roller 14 can be additionally moved into the other operating positions. The bridge roller 14 furthermore can be simultaneously removed from the roller 06, 11, 13 applying the dampening agent 02 to the forme cylinder 09 and from the ink application roller 17. The bridge roller 14 is placed into contact if it is touching one of the rollers 06, 11, 13 applying the dampening agent 02 to the forme cylinder 09, and/or the ink application roller 17, or is at least in an operative contact with them for conveying the ink or the dampening agent 02, while it is removed if its surface does not touch the surface of one of the said rollers 06, 11, 13, or the surfaces of the said rollers 06, 11, 13 are at least not in operative contact for conveying the ink or the dampening agent 02. The upstream

seated bridge roller 23 can also have several operating positions by being either in contact with the first bridge roller 14 or the third roller 11, or is removed from at least one of these rollers 11, 14, wherein at least one actuating means (not represented), for example a working cylinder, in particular a pneumatic cylinder, is provided, wherein the actuating means moves the upstream located bridge roller 23 from one into the other operating position, wherein the actuation of this actuation means can preferably also take place by remote control, in particular from the control console.

Upon contact, a flattened strip of a width between 3 mm and 8 mm, preferably between 5 mm and 6 mm, is formed in the axial direction between the rollers 04, 06, 11, 13 on their surfaces. The flattened strip between the roller 06, 11, 13 applying the dampening agent 02 to the forme cylinder 09, or the ink application roller 17 and the forme cylinder 09, can have a width of 8 mm up to 10 mm. The contact between the rollers 04, 06, 11, 13, 17 and the forme cylinder 09 is set, for example manually, by means of an adjusting spindle, preferably through a path change, wherein the set width of the strip remains unchanged during the printing process. If the width of the strip is to be changeable during the printing process, it is advantageous to perform the setting of the rollers 04, 06, 11, 13, 17 by means of a roller lock, which performs, for example remotely controlled preferably by actuation from the control console, a radial lift. As a rule, the setting of the width of the strip takes place independently of the surface speed v09 of the forme cylinder 09.

The bridge roller 14 is preferably embodied to perform traversing movements and is driven, for example, by a traversing drive mechanism 21, preferably embodied as a controllable motor 21, for example as a linear motor 21, preferably independently of its rotatory movement, wherein a further drive mechanism 22, which is independent of the other drive mechanisms 07, 08, 18, can be provided, for example a motor 22, preferably an a.c. or d.c. motor 22 or a frequency-controlled multiphase a.c. motor 22, in particular an electrical motor 22 which can be remote-controlled.

If the roller 11, 13 applying the dampening agent 02 to the forme cylinder 09 is driven by friction, this roller 11, 13 can be seated in the frame in such a way that an axial lift of, for example, 3 mm to 4 mm, is possible, wherein this lift is performed in that it is taken along by the traversing movement of the bridge roller 14. Preferably no, or only a minimal slippage of less than 2%, preferably less than 1%, exists between the roller 11, 13 applying the dampening agent 02 and the forme cylinder 09. As an alternative to frictional driving in connection with special applications it is, however, also possible to provide the roller 11, 13 applying the dampening agent 02 to the forme cylinder 09 with its own drive mechanism (not represented) for the rotatory movement, which is independent of the other drive mechanisms 07, 08, 18, 22, for example a motor, preferably an a.c. or d.c. motor or a frequency-controlled multiphase a.c. current motor.

For changing the dampening unit 01 between the operating mode "direct dampening" and the operating mode "indirect dampening" it can be provided that the roller 11,

13 applying the dampening agent 02 to the forme cylinder 09 can be placed against the bridge roller 14 or can be moved away from it. For this purpose, the roller 11, 13 applying the dampening agent 02 to the forme cylinder 09, in this case the roller 13, is represented in two operating positions in Fig. 2. In the dash-dotted representation, the roller 13 has been moved away from the bridge roller 14. For moving the roller 11, 13 applying the dampening agent 02 to the forme cylinder 09 into its desired operating position, at least one actuating means (not represented), which preferably is remote-controlled, for example from the control console, is provided, for example a working cylinder, preferably a pneumatic cylinder, which brings the roller 11, 13 applying the dampening agent 02 to the forme cylinder 09 into one of the two operating positions in respect to the bridge roller 14, or moves it away from the forme cylinder 09. The roller 11, 13 applying the dampening agent 02 to the forme cylinder 09 can be seated in eccentric bushings, for example, in which the roller 11, 13 applying the dampening agent 02 to the forme cylinder 09 can be moved into its desired operating position by the actuating means. The operating mode "direct dampening" is selected if the roller 11, 13 applying the dampening agent 02 to the forme cylinder 09 is placed against the forme cylinder 09 and moved away from the bridge roller 14. In this mode of operation the roller 11, 13 applying the dampening agent 02 to the forme cylinder 09 only applies the dampening agent 02 to the forme cylinder 09. The mode of operation "indirect dampening" is selected if the roller 11, 13 applying the dampening agent 02 to the forme cylinder 09 is simultaneously placed against the forme cylinder 09 and

the bridge roller 14. During "indirect dampening" the roller 11, 13 applying the dampening agent 02 to the forme cylinder 09 also conveys a not inconsiderable amount of ink coming from the inking unit 18 to the forme cylinder 09.

It can be provided that the first roller 04 and the second roller 06 can be moved away together from the roller 11, 13 applying the dampening agent 02 to the forme cylinder 09. For this purpose, the first roller 04 and the second roller 06 can be seated in a common support, wherein the support has a rotating point, around with the support can be rotated, so that the first roller 04 and the second roller 06 together pivot away from the roller 11, 13 applying the dampening agent 02 to the forme cylinder 09.

The surface of the first roller 04 consists for example of an elastomeric material, preferably rubber, in particular of a material of a hardness between 20 and 30 Shore A, preferably approximately 25 Shore A. The surface of the second roller 06 consists for example of a ceramic material or a chromium-containing material, wherein a coating of a chromium-containing material has been applied to a roller core of a metallic material, for example. The surface of the roller 11, 13 applying the dampening agent 02 to the forme cylinder 09 in turn consists, for example, of an elastomeric material, preferably rubber, in particular of a material of a hardness between 25 and 40 Shore A, preferably approximately 35 Shore A. The surface of the roller 11, 13 applying the dampening agent 02 to the forme cylinder 09 is therefore made harder than the surface of the first roller 04. The surface of the second roller 06 is preferably designed to be very much harder, for example harder by a factor of ten, than the

surface of the first roller 04 or the surface of the roller 11, 13 applying the dampening agent 02 to the forme cylinder 09. The surface of the bridge roller 14 is made of a plastic material, for example, preferably of Rilsan. However, the surface of the upstream located roller 23 can consist of an elastomeric material, preferably of rubber.

The surface speeds of the forme cylinder 09 to the roller 13 applying the dampening agent 02 to the forme cylinder 09 to the third roller 11 to the second roller 06 to the first roller 04 are, for example, like 1 to (1 to 0.98) to (0.4 to 0.98) to (0.25 to 0.4) to (0.08 to 0.18), preferably 1 to 0.99 to 0.96 to 0.33 to 0.1. If using only three rollers in the roller train between the forme cylinder 09 and the dampening agent reservoir 03, the slippage ratio separately mentioned above for the third roller 11 can be omitted, because the roller 11 already is the roller applying the dampening agent 02 to the forme cylinder 09.

List of Reference Symbols

01	Dampening unit, film-type dampening unit
02	Dampening agent, water, alcohol-water mixture
03	Dampening agent source, dampening agent reservoir, dampening agent tank, trough, spray crosspiece, spray nozzle
04	Roller, first, dipping roller, duct roller
05	-
06	Roller, second, metering roller, dampening agent transfer roller, distribution roller
07	Drive mechanism, motor, a.c. or d.c. motor, multiphase a.c. motor
08	Drive mechanism, motor, a.c. or d.c. motor, multiphase a.c. motor
09	Forme cylinder
10	-
11	Roller, third
12	Gears, gear wheel drive, belt drive
13	Roller, fourth
14	Bridge roller, ink distribution roller
15	-
16	Inking unit
17	Ink application roller
18	Drive mechanism, motor, multiphase a.c. motor
19	Drive mechanism for traversing movements, motor, linear motor
20	-

21	Drive mechanism for traversing movements, motor, linear motor
22	Drive mechanism, motor, a.c. or d.c. motor, multiphase a.c. motor
23	Upstream-located bridge roller
v04	Surface speed (04)
v06	Surface speed (06)
v09	Surface speed (09)